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bats, I am very positive that their condition was not that of ordinary slumber, and the tropical temperature, at the time, even through the night, certainly suggests æstivation as the most plausible explanation of the phenomena I have described.

C. C. ABBOTT.

THE LIFE OF GEN. EMORY UPTON.

GENERAL EMORY UPTON, at the time of his early death in 1881, was probably the most accomplished officer in the United States army. He had a genius for the science of military tactics, and, as a thinker and writer upon this subject, has left a name of enduring renown. General Michie, the well-known professor of physics at West Point, aided by General James H. Wilson, who was distinguished in the cavalry service during the civil war, has recently published an extended memoir of Upton, tracing the various steps of his advancement through boyhood, with his strong desire to go to West Point; through his cadet life, in which he won high rank; through his varied and arduous experience in the three branches of army service during the war, winning success in each; through his career as the commandant of cadets, as an instructor in artillery at Fortress Monroe, as an official observer and student of the armies of Europe and Asia, and especially as an authority on military principles and practice. General Wilson says of Upton, that he was "as good an artillery officer as could be found in any country, the equal of any cavalry commander of his day, and, all things considered, the best commander of a division of infantry in either the union or rebel army." This is high praise, but the volume by General Michie shows how such success was won, and leads us to believe that Upton's name, as years roll by, will be honored more and more as one of the greatest tacticians of modern times. His personal character was as remarkable as his professional. Like Havelock, Stonewall Jackson, Chinese Gordon, and many other heroes, he developed a religious life of the purest and most lofty type. Toward the end of his life he was engaged upon a study of the military policy of the United States during the revolution, and from that time down to the year 1862, when his manuscript ends. In this work he was associated with his classmate at West Point, Col. H. A. Du Pont, by whom the task will doubtless be completed. From the outline given by General Michie, it is clear that the treatise will be of the greatest value, not to military men only, but

to all students of history, and especially to statesmen. It will throw a great deal of light on the causes of success and of failure in the various campaigns which have taxed the resources of our countrymen. The publication of this manuscript is greatly to be desired.

As a soldier and as a writer, Upton may be described as one who applied the principles of scientific method to the organization and management of armies. His aim was lofty; his success was great.

DOOLITTLE'S PRACTICAL ASTRONOMY.

PROFESSOR DOOLITTLE has given us an excellent manual, either for the student or for the worker in the field. Intended only for field astronomy and navigation, we find no treatment of observational methods with large instruments, but its own field is thoroughly covered. "The author has not sought after originality, but has attempted to present in a systematic form the most approved methods in actual use at the present time." It is a comfort to turn the pages and find standard formulæ in a familiar dress. Much of the 'originality' of many modern text-books consists in rigging out old accepted formulæ in a new alphabetical suit, so that no one can be quite sure he is using just the right one without constant reference to the great 'original.'

We can only give an outline of the contents. The introduction develops in a simple but thorough manner the method of least-squares and the subject of interpolation. The different systems of spherical co-ordinates, the formulæ for their transformation and for parallax, refraction, etc., are very completely developed. Under the subject of angular measurements, verniers, micrometer-microscopes, graduated circles and their sources of error, chronometers, clocks, and chronographs are fully described and investigated. With the treatment of the adjustments and errors of the sextant, is introduced an example of the determination of the eccentricity by star observations, from the work of Professor Boss on the northern boundary survey; and chapter v. develops thoroughly the best methods of determining time and latitude by the sextant or any altitude instrument. The transit-instrument in its various forms, both in the meridian and prime-vertical, is very fully treated; likewise the determination of longitude by chronometers, by telegraph, by lunar distances, by moon-culminations, and by occultations of stars. Of course, the zenith-telescope claims its due share of attention, and an unusually complete chapter

Life and letters of Emory Upton, Brvt. Maj.-Gen. U. S. army. By PETER S. MICHIE. With an introduction by Jas. Harrison Wilson. New York, Appleton, 1885. 28+511 p. 8°.

A treatise on practical astronomy, as applied to geodesy and navigation. By C. L. DOOLITTLE. New York, Wiley, 1885. 8°.